Space Weather Forecast

Issued on Monday, 22 May 2023 at 01:29 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

Space Weather Forecast Headline: Minor/Moderate radio blackouts likely. G1 Minor/ G2 Moderate Geomagnetic Storms likely day 2 (23 May).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Moderate with a couple of moderate flares occurring from the complex region in the northeast quadrant. Ongoing development has been observed in this region, with both spreading and breaking of its larger spots, but also a further increase in the number of smaller spots. A further region that is rotating over the west limb produced a Common class flare, that was only just below the level of a Moderate flares. A further large region is in the southeast disc, however this is a stable and simple spot with little activity observed. The other regions are all smaller and simple to give at total of eight sunspot regions on the disc. No Earth-directed CMEs (coronal mass ejections) have been observed in the past 24 hours.

Solar Wind / Geomagnetic Activity: The solar wind decline from elevated speeds of 550-600 km/s to around 450 km/s. This then gradually rose from 21/1300 UTC to reach elevated levels 550-600 km/s again. This was due to a combination of a weak CME arrival, perhaps from 17 May, alongside a change into faster solar winds. The total magnetic field strength was Weak at first, but rose to from 21/1300 UTC to peak at Moderate levels. The north-south component was mainly negative (southward pointed), and moderate in strength. Geomagnetic activity was initially quiet to Unsettled, but rose to give G2/Moderate storms (Kp6) 1800-2400 UTC.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) was at background with no solar radiation storms occurring.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to be mainly Moderate, with a slight chance of High activity. The main risk region is in the northeast quadrant, which has produced multiple Moderate flares in the last couple of days.

Solar Wind / Geomagnetic Activity: There are no Earth-directed CMEs. Current elevated solar winds are expected to gradually ease on day 1 (22 May) before the onset of a further enhancement from the arrival of the fast wind from a coronal hole. This is expected on day 2 (23 May), with solar winds likely to peak around 600 km/s, and only gradually easing later in the period. Further G1/Minor storms are possible early day 1 (22 May) before geomagnetic conditions likely ease to Quiet to Unsettled with chance of Active. Fast wind arrival later day 1 or more likely day 2 (22-23 May) is then expected to give Active to G1 Minor Storms, with a chance of isolated G2 Moderate storms. These conditions easing through day 3 and day 4 (24-25 May) to be mainly Quiet to Unsettled with Active intervals.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is forecast to be at background with no solar radiation storms occurring. There is a slight chance of count rates increase towards the minor storm threshold however, if any large flares occur.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	30	60	30	1
Strong	G3	No	1	5	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	60	60	60
Very Active	R3 to R5 X	No	20	20	20	20

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	10	10	10
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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